

LABORATORY, SHOP, AND TEST FACILITY MANAGEMENT PLAN

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LABORATORY, SHOP, AND TEST FACILITY MANAGEMENT PLAN

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RECORD OF REVISIONS/CHANGES

REV LTR	CHG NO.	DESCRIPTION	DATE
		Basic issue.	February 1, 2012
A		Added Document Revision Record, added hot links, corrected errors, updated specific lab management plan instructions, added maintenance and calibration, added mandatory training for civil servants, and added lab management for UB lab.	February 28, 2013
B		Comprehensive revision, made applicable to UB laboratories, and removed the concept of Laboratory and Engineering Scales.	September 30, 2016
C		Performed comprehensive revision to reflect contract change from the Engineering Services Contract to Laboratory Support Services and Operations Contract (LASSO) and to include LASSO Operational Labs and Test and Operations Support Contract (EDL and LETF) safety and health processes and procedures; deleted Figure 1. Management Structure for Review and Approval of Work Activities; deleted Figure 2. Work Management Classification; re-defined work classification as Level 1 and Level 2 work to integrate Operational Laboratories and Launch Equipment Test Facility safety processes; added/updated hyperlinks; replaced NE SharePoint Site with SHRB SharePoint site; added Government purchase card requirements for procurement of chemicals, biological agents and hazardous materials; added language for minors working in Section 10; removed General training QG320OSH <i>Hazard Communication for Laboratory Workers</i> from document since it is required per KNPR 1840.19.	August 8, 2018

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

Units of measure and some terms commonly understood within the subject disciplines have been abbreviated in the body of this document without callout but are included among the following.

ALC	Authorized Laboratory Capability
ASC	Authorized Shop Capability
ASME	American Society of Mechanical Engineers
BSO	Biological Safety Officer
CCAFS	Cape Canaveral Air Force Station
CCL	Commerce Control List
CD	Center Director
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHSO	Contractor Hygiene and Safety Officer
COPV	Carbon Overwrap Pressure Vessel
COTS	Commercial Off The Shelf
DOT	Department of Transportation
EAR	Export Administration Regulations
EHS	Environmental Health and Safety
FLSA	Federal Fair Labor Standards Act
ft-lb	foot - pounds
GRRP	Ground Risk Review Panel
HARA	Hazard Analysis and Risk Assessment
HMI	Hazard Mitigation Inventory (KSC Form 50-211, Laboratory Hazard & Mitigation Inventory)
HSO	Hygiene and Safety Officer
ISBN	International Standard Book Number
IT	Information Technology
ITAR	International Traffic in Arms Regulations
KEMCON	Kennedy Environmental and Medical Contract
KDP	Kennedy Documented Process
KLCC	Kennedy Laboratory Capabilities Committee

KNPD	Kennedy NASA Policy Directive
KNPR	Kennedy NASA Procedural Requirement
KSC	Kennedy Space Center
L	Liters
Lab	Laboratory
LASSO	Laboratory Support Services and Operations Contract
LEL	Lower Explosive Limit
LETF	Launch Equipment Test Facility
LSCHP	Laboratory Safety and Chemical Hygiene Plan
LSTF	Laboratory, Shop, and Test Facility
ml	milliliter
NASA	National Aeronautics and Space Administration
NE	Engineering Directorate
NFPA	National Fire Protection Association
NHSO	NASA Hygiene and Safety Officer
NLR	No License Required
Ops	Operations
OSHA	Occupational Safety and Health Administration
PL	Project Lead
PLN	Plan
POC	Point of contact
PPE	Personal protective equipment
PR	Purchase Request
PSM	KSC Pressure Systems Manager
PVS	Pressure Vessels and Pressurized Systems
S&MA	Safety and Mission Assurance
SA	Safety and Mission Assurance Directorate
SDS	Safety Data Sheet
SHRB	Safety and Health Review Board
SI	Spaceport Integration and Services Directorate
SOP	Standard Operating Procedure

STD	Standard
TME	Test and measuring equipment
TOSC	Test and Operations Support Contract
UB	Exploration Research and Technology Programs Directorate
UG	User Guide
UL	Underwriters Laboratory
WAC	Work Authorization Control System
WAM	Work Area Manager
WAMP	Work Area Management Plan

1. INTRODUCTION

1.1 Purpose

This plan defines the approach by the Engineering Directorate (NE) and the Exploration Research and Technology Program Directorate (UB) to manage work activities in specified [laboratories, shops, test facilities](#), and other areas where non-office work is performed to ensure operational safety. As such, it is imperative that NASA, in partnership with the Laboratory Support Services and Operations Contract (LASSO) and the Test and Operations Support Contract (TOSC), establish the technical and managerial oversight that will assure the most efficient and cost effective laboratory operations, while ensuring personnel safety and protecting KSC infrastructure. It defines the mechanism for review and approval of safety documents, including management plans, documented procedures, and other documents required for safe operations.

1.2 Scope

This plan establishes management policies and outlines roles and responsibilities for the management and safe operation of NE and UB-managed work areas. Specifically, it will outline the NASA, LASSO and TOSC strategy for roles, responsibilities and work classification in regard to operations and safety management. The plan includes a traditional laboratory, shop or test facility; may include off-center operations and work in field settings requiring the physical presence of KSC personnel (civil servants or contractors); and utilization of Government Furnished Equipment (GFE) and flight hardware. The list of current laboratories, shops and test facilities covered by this plan is located on the SHRB SharePoint site. The plan is applicable to individuals entering or performing work in the laboratories, shops and test facilities managed by NE and UB. Additionally, other work areas not managed by a NASA Program's safety plan can be evaluated by the Safety and Health Review Board (SHRB) to determine if the work should be managed by this plan.

2. DOCUMENTS

2.1 Applicable Documents

The following documents form a part of this document to the extent specified herein:

29 CFR 1910.103	Hydrogen
29 CFR 1910.104	Oxygen
29 CFR 1910.1450	Occupational Safety and Health Standards, Toxic and Hazardous Substances; Occupational exposure to hazardous chemicals in laboratories
B-0021	Safety and Health Review Board Charter

NASA Form 1707	Special Approvals and Affirmations of Requisitions
KDP-KSC-P-1473	KSC Mishap Reporting and Investigating
KDP-KSC-P-3621	Ground-Based Pressure Vessels and Pressurized Systems (PVS) Certification
KDP-KSC-P-5458	Capabilities Determination Process
KDP-KSC-P-5459	Safety and Health Review Board (SHRB) Process
KNPD 8500.1	KSC Environmental Management
KNPR 1840.19	KSC Industrial Hygiene Programs
KNPR 8700.2	KSC System Safety and Reliability Analysis Procedural Requirements
KNPR 8715.3-1	KSC Safety Procedural Requirements, Volume 1, Safety Procedural Requirements for Civil Servants/NASA Contractors
KNPR 8730.1	KSC Metrology and Calibration Procedural Requirements
KSC Form 50-211	Laboratory Hazard & Mitigation Inventory
KSC-NE-13219	NASA KSC NE Laboratory (LAB) Pressure Vessel and Pressurized Systems (PVS) Policy
KSC-PLN-1800	Laboratory Safety and Chemical Hygiene Plan
KSC-PLN-1801	Biological Safety Plan
KSC-UG-2804	Reporting Hazards and Safety Concerns
LASSO-SHP-P-0098	Static Magnetic Fields
NASA-STD-8719.17	NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PVS)
NASA-STD-8739.12	Metrology and Calibration
NPR 1800.1	NASA Occupational Health Program Procedure

2.2 Reference Documents

The following documents are not cited herein, but are listed for informational purposes:

<u>29 CFR 1910.1200</u>	Occupational Safety and Health Standards, Toxic and Hazardous Substances, Hazard communication
<u>29 CFR 1910.132-138</u>	Occupational Safety and Health Standards, Personal Protective Equipment
<u>CGA G-4</u>	Oxygen
<u>CGA G-5</u>	Hydrogen
<u>CGA P-1</u>	Standard for Safe Handling of Compressed Gases in Containers
<u>CGA P-12</u>	Safe Handling of Cryogenic Liquids
<u>KDP-KSC-P-3001</u>	Warning, Alerting, and Evacuation
<u>KDP-KSC-P-3008</u>	Hazardous Materials Emergency Response
<u>KNPD 1860.1</u>	KSC Ionizing Radiation Protection Program
<u>KNPR 1820.3</u>	KSC Hearing Loss Prevention Program
<u>KNPR 1820.4</u>	KSC Respiratory Protection Program
<u>KNPR 1840.1</u>	KSC Hazard Communication Program
<u>KNPR 8715.5</u>	KSC Personal Protective Equipment (PPE)
<u>KSC-PLN-2305</u>	KSC Engineering & and Technology Directorate (NE) Qualification Plan and Requirements Document
<u>NASA-STD-8719.11</u>	Safety Standard for Fire Protection
<u>NFPA 45</u>	Standard on Fire Protection for Laboratories Using Chemicals
<u>NFPA 55</u>	Compressed Gases and Cryogenic Fluids Code

3. GENERAL REQUIREMENTS

3.1 Management of Work Areas

The directors of NE and UB have delegated the oversight authority for workplace safety and health to the SHRB. The SHRB evaluates work for management review and acceptance of risk and hazards.

The hierarchy of management documentation is shown in Figure 1. The work-area-specific plans or documents outline how the different areas will meet the requirements of this document and how safety will be managed. All work performed will be captured in either a capabilities document or through specific procedures, depending on the type of work. The steps taken to mitigate all associated hazards and risks are described in a written hazard analysis.

The work area specific management plan includes requirements to ensure the following:

- Lines of accountability and authority are understood;
- Work area hazards are identified and evaluated;
- Appropriate hazard controls are in place;
- Workers have the ability to voice safety concerns and have the authority to stop work that is perceived as unsafe;
- Clear lines of communication are maintained.

NASA employees, contractors, sub-contractors and visitors shall adhere to the rules, policies and processes in this document and to those stated in reference documents for all work areas within the scope.

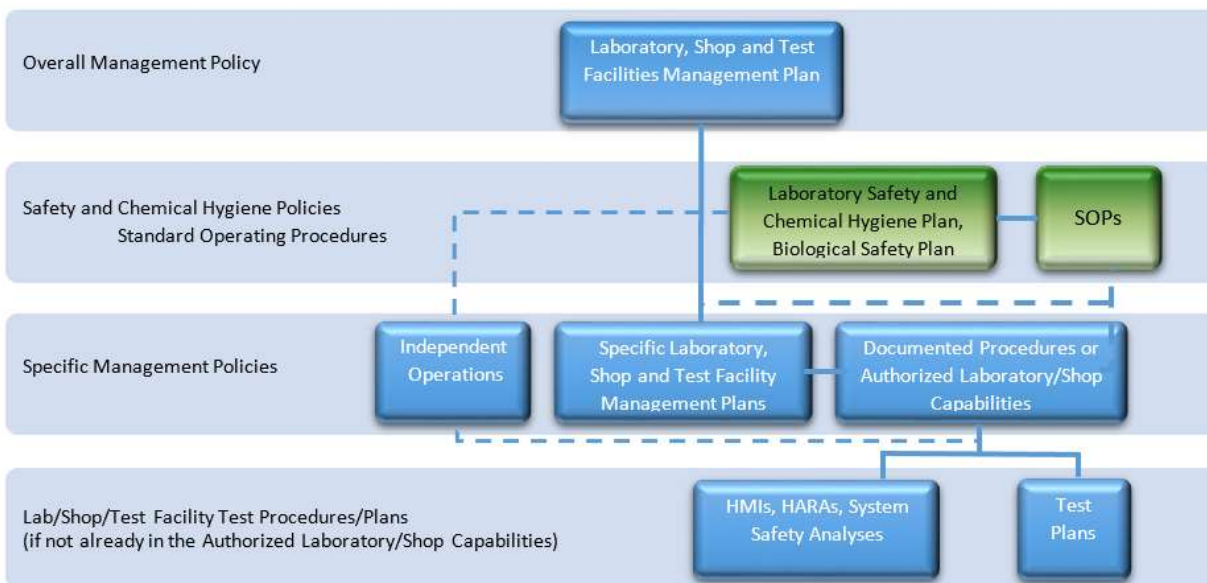


Figure 1. Document Management Hierarchy

3.2 Responsibilities

3.2.1 Director of Engineering

The Director of NE is responsible for the overall safety and management of assigned NE work areas. The Director of NE has delegated the authority for the safe and successful operation of NASA-managed work area to the Division Chief and Contractor-managed work areas to the Program Manager.

The NE Director appoints the SHRB Chair, the NASA Hygiene and Safety Officer (NHSO), and the Secretariats.

3.2.2 Director of Exploration Research and Technology Programs

The Director of UB is responsible for the overall safety and management of assigned UB work areas and has delegated responsibility for the safe and successful operations of each work area to the Division/Office Chief.

The UB Director appoints the SHRB Co-Chair, the NASA Biological Safety Officer (BSO) and Secretariat (if applicable).

3.2.3 Division/Office Chief or Contractor Program Manager

The Division/Office Chief and Contractor Program Manager (or delegate) appoints the work area managers and ensures that the work area management plan, documented procedures, and safety documentation are in place. The Division/Office Chief, Program Manager or delegate, in consultation with the SHRB, provides documented approval for participation of minors in NE/UB work areas in compliance with the State of Florida and the Federal Fair Labor Standards Act (FLSA).

3.2.4 NASA Safety and Mission Assurance

The Safety and Mission Assurance Directorate (SA) participates in the SHRB process as the point of contact (POC) for NASA/KSC safety policies and regulations. SA is responsible for providing technical guidance for institutional safety and safety engineering, including hazard assessment of operations, tasks or procedures with the potential to expose employees to physical hazards. SA will recommend methods to eliminate or control physical hazards and comply with applicable Occupational Safety and Health Administration (OSHA), NASA and KSC requirements.

SA is responsible for monitoring the effectiveness of this plan and assessing the work areas for compliance.

Higher-level hazards will be elevated to the Ground Risk Review Panel (GRRP) for review as determined by the SA SHRB representative.

3.2.5 NASA Aerospace Medicine and Occupational Health

The Aerospace Medicine and Occupational Health Branch (SI-E1) participates in the SHRB process, providing technical guidance for occupational medicine, industrial hygiene and health physics, including hazard assessments of operations, tasks and procedures with the potential to expose employees to occupational health hazards. SI-E1 support includes:

- Reports survey results and recommends methods to eliminate or control occupational health hazards
- Provides information on requirements for employees to participate in medical monitoring programs
- Provides guidance for compliance with applicable OSHA regulations
- Participates in workplace inspections
- Provides for testing of exhaust ventilation systems
- Reviews plans, projects, and operational procedures to assess the adequacy of precautions taken to control hazards
- Helps select and design engineering controls, work practices, and personal protective equipment (PPE)

3.2.6 SHRB

The SHRB is the governing board for approval of work. The Board reviews and approves work area management plans, authorized capabilities and associated policies and procedures for NE and UB associated laboratories and test facilities. The Charter, B-0021, describes the role of the SHRB and identifies board members; [KPD-KSC-P-5459](#) documents the SHRB review process. The SHRB membership and associated appointment letters are available on the SHRB SharePoint site.

The SHRB performs the following functions:

- Reviews and approves management plans for specific work areas and associated safety documents
- Ensures hazards and risks are identified and mitigated in accordance with [KDP-KSC-P-5458](#)
- Reviews compliance with management plans and safety documentation
- Elevates operations/test for approval by GRRP or higher approval authority, as required
- Provides a forum for resolving safety and health issues
- Determines overall guidance of how an area will manage safety and health
- Assists supervisors in determining safety and health requirements for offsite work

3.2.7 Branch Chief

Branch/Office Chiefs are responsible for the overall safety and health of their employees. The Branch/Office Chief reviews and approves the work area documentation.

As necessary, Branch/Office Chiefs coordinate with work area managers and contractor managers to ensure:

- Safety issues/concerns identified by employees are resolved;
- Safe work requirements are documented in an existing safety process or other approved work authorizing document;
- Safety equipment, including PPE, is available for employees to use;
- Employees have met the safety requirements and have obtained training to perform work;
- Incidents, close calls, and mishaps are reported in accordance with [KDP-KSC-P-1473](#);
- Open, non-retaliatory lines of communications are maintained with their employees;
- Employees are encouraged to report unsafe or unhealthy acts or conditions, mishaps and close calls.

3.2.8 Contractor Managers

Contractor Management is responsible for the overall safety and health of their employees. Managers approve work area documentation, if applicable, and coordinate with the NASA work area managers and Branch/Office Chiefs to ensure:

- Safety issues/concerns identified by employees are resolved;
- Safe work requirements are documented in an existing safety process or other approved work authorizing document;
- Safety equipment, including PPE, is available for employees to use;
- Employees have met the safety requirements and have obtained training to perform work;
- Incidents, close-calls and mishaps are reported in accordance with [KDP-KSC-P-1473](#);
- Open, non-retaliatory lines of communications are maintained with their employees;
- Employees are encouraged to report unsafe or unhealthy acts or conditions, mishaps and close-calls.

3.2.9 Work Area Manager

Work Area Manager (WAM) is defined as a laboratory manager, shop manager or laboratory lead and is responsible for one or more assigned work area(s), ensuring the following:

- Work follows an approved, documented procedure or falls under an approved capability in accordance with [KDP-KSC-P-5458](#) Capabilities Determination Process;
- Ensures hazards are identified and mitigations are documented;
- Work area management plans (WAMP) and safety documents are established, maintained and implemented;
- Safety training requirements are identified and documented;
- Only authorized personnel have access to controlled work areas;
- A list of people authorized to access the work area and use its equipment is maintained;
- A list of chemicals and hazardous materials and associated Safety Data Sheets (SDS) are available;
- The use of chemicals and hazardous materials have been approved by the NHSO or CHSO;
- Incidents, close-calls and mishaps are reported in accordance with [KDP-KSC-P-1473](#).

3.2.10 Hygiene and Safety Officers

The NHSO and CHSO are the POCs for safety and health concerns, and perform the following functions:

- Review and update [KSC-PLN-1800](#), as needed;
- Assist managers, project leads (PLs), and employees to interpret applicable safety, health and environmental standards, determining requirement applicability and recommending improvements to processes;
- Assist personnel in writing safety documentation to ensure compliance with the applicable requirements of [29 CFR 1910.1450](#), [KNPR 1840.19](#), [KNPR 8700.2](#), and [KNPR 8715.3-1](#);
- Participate in the SHRB process;
- Review and approve procurements of chemicals, hazardous materials and hazardous equipment;
- Provide consultation for the safe use of hazardous materials and equipment.

3.2.11 Biological Safety Officer

The BSO is the POC for biological safety concerns and performs the following:

- Reviews and updates KSC-PLN-1801, as needed;
- Ensures that biological safety documentation for the work areas meets the requirements of [NPR 1800.1](#) and [KNPR 1840.19](#);
- Ensures that applicable biological safety plans are maintained;
- Participates in the SHRB process;
- Reviews and approves the use and procurement of biological substances;
- Ensures the list of biological materials in use or in storage is maintained;
- Provides consultation for the safe use of biological materials and biological safety concerns.

3.2.12 Employee Responsibility

Employees are ultimately responsible for their own safety. They are responsible for following the rules and guidelines established in this plan and other applicable safety and health requirements. Employees are responsible for the following:

- Ensuring a safe and healthful workplace for themselves and their coworkers by working safely and complying with safety policies and procedures;
- Using PPE correctly and following the provided training and instruction;
- Completing their required safety and health training;
- Assessing their workplace for unsafe and unhealthful acts or conditions, reporting workplace hazards to their supervisor, and eliminating hazards within their immediate control;
- Reporting mishaps and close-calls to their supervisor and work area manager.

3.2.13 Project Lead

Project lead (PL) is a generic term for a KSC project/task leader, used to designate a project manager, principal investigator, primary investigator, test conductor or task lead. The PL directs the technical effort for work performed in the area. The PL is accountable for coordinating with the work area manager or laboratory lead to ensure the following:

- Work follows a documented procedure or falls within an approved capability;
- Task-specific hazards are identified and mitigated;
- Team members have received required training in accordance with the documented procedure or approved capability;
- The work is performed safely.

4. WORK CLASSIFICATION

The SHRB determines the required level of hazard analysis, hazardous classification, and need for documented procedures for work in the NE and UB-managed areas. Work is classified as Level 1 or Level 2 and is assessed by the WAM, PL or supervisor using the Work Classification Checklist in Figure 2. Any “YES” response in the checklist is considered Level 2 work.

Level 1 work is performed in accordance with [KNPR 1840.19](#) and includes work where relatively small quantities of hazardous chemicals are used on a non-production basis. Additionally, Level 1 work includes work with substances in which the containers used for reactions, transfers and other handling of substances are designed to be easily and safely manipulated by one person.

Level 2 work requires a fully documented procedure in accordance with [KNPR 8715.3-1](#) Chapter 6 and a more extensive risk assessment method as defined in [KNPR 8700.2](#) Chapter 5. Level 2 work is a task or operation that meets any of the following:

- Multiple tasks or operations in a procedure that need to be coordinated simultaneously
- Control areas that cannot be managed by the person doing the work
- One person cannot control the aspects of the testing or operation, including the contingencies

Examples of Level 2 work include launch equipment testing, component refurbishment, or independent operations not associated with a laboratory, shop or test facility; or work not covered under the normal or established work practices. Government or contractor management may choose to implement hazard controls using requirements that are more stringent.

Work Classification Checklist	NO (Level 1 Work)	YES (Level 2 Work)
Will personnel handle, store, or transport solid propellants, ordinance, or explosives? (All uses are evaluated by the Explosive Safety Officer (ESO) per NASA-STD-8719.12 , Safety Standard for Explosives, Propellants and Pyrotechnics)		
Will personnel handle, flow, store, or transport hypergolic propellants greater than 50 milliliters (mL)?		
Will personnel handle, flow, store, or transport liquid propellants or explosives? (All uses are evaluated by the ESO)		
Will personnel handle, flow, or store, cryogenic asphyxiants in quantities greater than 10 liters (L)?		
Will personnel handle, flow, or store cryogenics?		
Will personnel use or generate gaseous oxygen or hydrogen or any flammable gas (with concentrations higher than the Lower Explosive Level (LEL) in a gas manifold or a secondary vessel or a sampling bag greater than 1 L?		
Will commercial off-the-shelf (COTS) electrical equipment be intentionally operated beyond the manufacturer's specifications and UL listing?		
Will electrical operations involve energized electrical systems that may expose personnel to hazards that are not mitigated to prevent injury/death? Reference KNPR 8715.3-1 Section 6.1, and NFPA 70E for required controls to mitigate electrical hazards.		
Will personnel pressurize a non-Department of Transportation (DOT or ASME)-approved Composite Overwrapped Pressure Vessel (COPV)?		
Will personnel intentionally use equipment or test objects outside of its intended use or configuration?		
Will personnel handle magnets with an impact energy greater than 58 ft-lb or 78 joules? (Reference LASSO-SHP-P-0098, <i>Static Magnetic Fields</i>)		
<p>Additional Criteria:</p> <ol style="list-style-type: none"> Any "YES" response is considered Level 2 work. Level 1 work shall be performed in accordance with KNPR 1840.19. Level 2 work requires a fully documented procedure in accordance with KNPR 8715.3-1 Chapter 6 and a more in-depth hazard analysis in accordance with KNPR 8700.2 Chapter 5. For use of ionizing or non-ionizing sources, follow the requirements of the Use Authorization in accordance with KNPR 1860.1 and KNPR 1860.2. For chemical use not covered by an existing HMI or a system safety analysis document, the NHSO/CHSO will determine the level of safety review. For new biological materials or change in procedure that have the potential to increase the hazardous level of the biological agent, the BSO will determine the level of safety review. 		

Figure 2. Work Level Classification

4.1 Level 1 Work Safety Management

Level 1 work is managed through a work-area-specific management plan (WAMP) and an Authorized Laboratory Capability (ALC) or Authorized Shop Capability (ASC) with a Hazard Mitigation Inventory (HMI) or a documented procedure with a Hazard Analysis and Risk Assessment (HARA). Government or Contractor management can choose to use documented procedures and HARAs for a laboratory, shop or test facility capability or independent operation. The documented procedures process is described in KNPR 8715.3 Chapter 6, and the HARA process is described in [KNPR 8700.2](#) Chapter 5.

4.1.1 Work Area-Specific Management Plan

A WAMP specifies requirements for each laboratory and is defined as a laboratory-specific laboratory management plan or shop-specific shop management plan. At a minimum, the content includes the following:

- Lines of accountability/authority are documented with who is responsible for work area safety and health activities, such as chemical inventory management, work area hazard identification and assessment, hazard mitigation, maintenance of safety supplies/equipment, specific training requirements, and work area access.
- The approach to identify and mitigate work area hazards.
- Data items are identified in the Work Area-Specific Management Plan Template found on the SHRB SharePoint Site.

The numbering scheme shall follow this higher-level plan, for example, KSC-PLN-2322_XXXX, where “XXXX” denotes a unique two-to-four-character laboratory or shop abbreviation, the WAMP shall follow the format of this plan.

The WAMP shall be approved by the SHRB and stored in TechDoc in accordance with [KPD-KSC-P-5459](#). The signature requirements are as follows:

- Approved by: Cognizant WAM
- Approved by: Cognizant Branch/Office Chief (if applicable)
- Approved by: Cognizant Contractor Manager (if applicable)
- Approved by: SHRB Chair

4.1.2 Authorized Laboratory/Shop Capabilities

Work performed in laboratories, shops or independent operations is documented in an approved ALC/ASC. The documentation describes the approved use of equipment, materials, processes and requirements for safe operations in the laboratory, shop or field location. ALCs/ASCs allow laboratories, shops or PLs to use these approved capabilities without further review or concurrence from the SHRB. This management approach provides consistent hazard identification and risk mitigation processes using hazard assessments, safety standard operating procedures (SOPs), and an appropriate review process in accordance with [KDP-KSC-P-5458](#).

The WAM generates the documentation for an ALC/ASC in accordance with [KDP-KSC-P-5458](#). The document number for each ALC/ASC follows the higher-level plan; for example, KSC-PLN-2322_XXXX-ALC/ASC-00X, where “XXXX” denotes the unique two-to-four-character laboratory/shop abbreviation and “00X” is a sequential number for each ALC/ASC. The document number for independent operations is designated as KSC-PLN-2322_000X, where “000X” is a sequential number.

The ALC/ASC documentation is a business record and includes the following:

- Processes/procedures, including emergency/unplanned contingency events
- Hazard assessments of processes/procedures and equipment, with mitigations identified and documented in an HMI, HARA or system safety analysis document
- Specific locations where capabilities are performed
- Safety training required for employees to execute the standard set of work steps
- Employees authorized to execute work within the capability
- Additional data items identified in the ALC/ASC template found in the SHRB SharePoint

The ALCs/ASCs are reviewed and approved by the SHRB. The documents are stored in TechDoc in accordance with [KPD-KSC-P-5459](#). The signature requirements are as follows:

- Approved by: Cognizant WAM
- Approved by: Cognizant Branch/Office Chief (if applicable)
- Approved by: Cognizant Contractor Manager (if applicable)
- Approved by: SHRB Chair

4.2 Level 2 Work Safety Management

Work classified as Level 2 can be reviewed and approved by an internal board (i.e. LETF test panel or operational laboratories project management office) as opposed to the SHRB. The hazards, risks and mitigations are managed through documented procedures, HARAs and other system safety analyses per KNPR 8700.2. The internal board shall:

- Determine overall guidance of how an area will manage safety and health;
- Establish titles and roles of board members, to include NASA SA engineering, industrial hygiene and a SHRB representative;
- Establish a process to ensure the identification and mitigation of hazards and risks as well as management review and acceptance of risks;

- Review and approve management plans, documented procedures, HARAs and other system safety analyses for work areas;
- Review compliance with management plans and safety documentation;
- Provide a forum for resolving safety and health issues;
- Elevate operations/test for approval by GRRP or higher approval authority as required.

The SHRB approves the overall process and determines the scope of work for Level 2. Although the required approval level for safety and reliability analyses is dependent on the level of risk identified in the analyses, thresholds for risk approval are in accordance with [KNPR 8700.2 Table A: Institutional Hazard Risk Approval Matrix](#).

In the event the institutional risk is elevated to the GRRP as a result of the Risk Approval Matrix, the documented procedure, HARAs and other system safety analyses shall be initially reviewed by the SHRB. Additionally, the documents shall be stored and maintained in a retrievable and auditable system (i.e. TechDoc) in accordance with [KPD-KSC-P-5459](#). The signature requirements are as follows:

- Approved by: Cognizant WAM
- Approved by: Cognizant Branch Chief (*if applicable*)
- Approved by: Cognizant Contractor Manager (*if applicable*)
- Approved by: SHRB Chair
- Approved by: GRRP Chair (*if applicable*)

5. PRESSURE VESSELS AND PRESSURIZED SYSTEMS

The WAM ensures PVS comply with [NASA-STD-8719.17](#), [KDP-KSC-P-3621](#), [KNPR 8715.3-1](#) (Chapter 8), and [KSC-NE-13219](#), whichever applies. WAMs obtain approved certifications or exclusions, from the KSC Pressure Systems Manager (PSM), for all ground-based PVS, in accordance with KDP-KSC-P-3621.

6. AUTHORITY TO STOP WORK

A safety concern can be expressed by anyone and should be expressed directly to the person performing the unsafe act of concern. Anyone working in the laboratory/shop (whether a participant, observer or other employee) who considers an action unsafe or unhealthful has the right and obligation to call a stop to that action. After the stop is called, the individual calling the stop work collaborates with the individual(s) performing the work to determine how the action can be safely resumed. If agreement is not reached or it is unclear how to safely proceed, the safety or health concern is to be elevated to the WAM. The WAM coordinates with the PL, Safety and Health, and other affected organizations to resolve the disagreement at the lowest management level

possible. Anyone can elevate the safety concern to higher levels of management or through safety reporting channels, as needed (reference [KSC-UG-2804 How to Report Emergencies and Safety Concerns at KSC](#)).

7. CHEMICAL, BIOLOGICAL AGENT AND HAZARDOUS MATERIALS MANAGEMENT

Approval must be obtained for the procurement of any chemical, biological agent or hazardous material by completing [NASA Form 1707 Kennedy Special Approvals and Affirmations of Requisitions](#) or the contractor procurement checklist. NASA Form 1707 is an e-Form that will automatically route to the HSO/BSO for approval. Approval also includes the use of the Government purchase card. The Government cardholder shall sufficiently document HSO/BSO approval in the cardholder files and properly annotate in the order log prior to placing an order.

This requirement applies to chemicals or hazardous materials, as defined in [KNPR 1840.1 KSC Hazard Communication Program](#), Appendix C, or biological agents, as defined by [KNPR 1840.19 KSC Industrial Hygiene Program](#). The HSO/BSO will approve any procurement for which there is a prior approval or an existing hazard assessment by Kennedy Environmental and Medical Contract (KEMCON) personnel. The hazard assessment is initiated by submission of [KSC Form 28-1044 Environmental Health and Environmental Services Support](#). NASA's goal is to minimize quantities, find less-hazardous alternatives, and reduce waste. No one shall bring in a new chemical, biological agent, or hazardous material obtained through a procurement or otherwise (i.e. vendor sample), into a work area without the prior approval of the WAM with concurrence from the HSO/BSO.

8. MAINTENANCE

Safety concerns associated with equipment maintenance will be addressed in the laboratory/shop specific management plan or documented procedures.

9. CALIBRATION OF TEST AND MEASURING EQUIPMENT

Calibration of test and measuring equipment (TME) is performed in accordance with [KNPR 8730.1](#) KSC Metrology and Calibration Procedural Requirements and NASA-STD-8739.12 Metrology and Calibration.

10. TRAINING

The purpose of the training is to ensure personnel are familiar with applicable safety and health requirements and understand management expectations for compliance. The WAM or contractor manager is accountable for defining and managing the safety training requirements for people who enter or work in laboratory/shop areas. Additionally, the WAM or contractor manager is responsible for identifying the required training for that laboratory or shop, refresher training requirements, and the process for maintaining auditable training records in the specific WAMP or documented procedure. Moreover, the WAM or contractor manager also establishes training requirements and

expectations for new employees, interns, visiting professors, and other episodic personnel before work commences in the laboratory. Interns/students who are defined as a minor in accordance with [Florida Department of Labor](#) must be escorted at all times and may not perform hazardous work. Additionally, only those interns/students in an officially NASA/Contractor-sponsored education program may perform work after they have completed training and have been authorized by the WAM.

10.1 General Training Requirements

Anyone entering unescorted or performing work in laboratories/shops is required to complete the following training courses:

- QG280KSC Laboratory Management and Safety – required every 3 years
- QG216KSC Laboratory Safety and Chemical Hygiene Plan – required annually

10.2 Access Training

Access training is required for any individual who needs to enter a specific laboratory, shop or test facility area, but is not by itself considered sufficient training for performing work.

Access training covers the following:

- Overview of operations unique to that laboratory area
- General safety procedures (including an overview of chemical hygiene and lab safety plans)
- Work Area Hazards
- Off-limit, control and cleared areas
- Laboratory-specific safety procedures
- Instructions for responding to a laboratory emergency, accident or incident

10.3 Training to Perform Work

Training is required for any individual performing work in a laboratory, shop or test facility, and it prepares employees to perform work associated with a specific capability. Training includes the following:

- Familiarization with lab equipment, its operation, and associated hazards
- Work procedures, including documented (or documenting) laboratory or shop procedures
- Review of capabilities/procedures/work documents/best practices
- Hazard analysis (including the boundaries of the hazardous work area)
- PPE requirements
- Hazard mitigation instructions

